# Hardware Assignment

**AI1110**: Probability and Random Variables

Indian Institute of Technology Hyderabad

CS22BTECH11061

Waghmare Aditya Abhaykumar

*Abstract*—**In this assignment we have made a Random number generator using shift registers**

## COMPONENTS USED

| Component | Value | Quantity |
|---|---|---|
| Breadboard | | 1 |
| Seven Segment Diplay | Common Anode | 1 |
| Decoder | 7447 | 1 |
| Flip Flop | 7474 | 2 |
| X-OR Gate | 7486 | 1 |
| 555 IC | | 1 |
| Resistor | 1 KΩ | 1 |
| Capacitor | 100 nF | 1 |
| Capacitor | 10 nF | 1 |
| Jumper Wires | | |

TABLE 0

COMPONENTS USED

## PROCEDURE

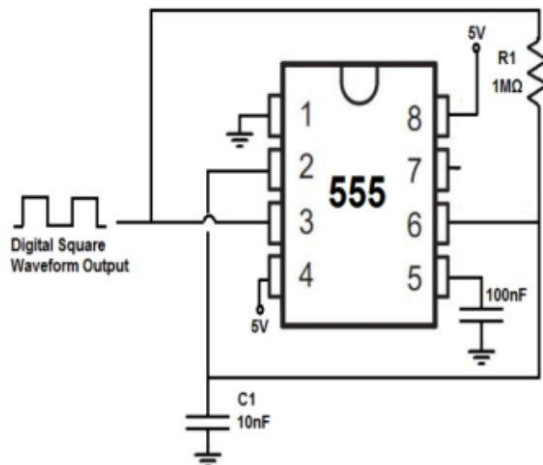1) First we generate the CLOCK signal using the 555 timer circuit as shown in figure 1



Fig. 1. Connection in 555 timer circuit

2) Then we connect Clock output of 555 timer circuit to the clock signal of D-Flip flops
3) Now we make the circuit for shift registers using 4 D-Flip flops (using two 7474 IC's) and one XOR gate(7486 IC) as shown in figure 4. Pin out for 7474 IC shown in figure 3
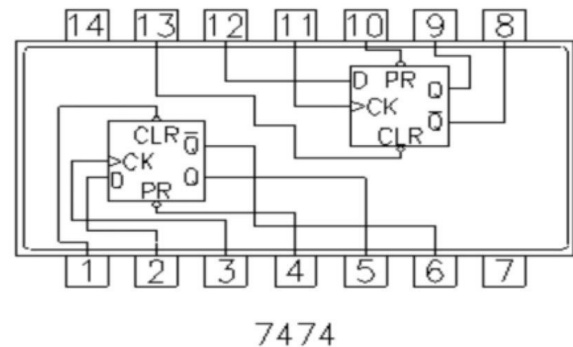


7474

Fig. 3. Connection in 7474 IC

4) Now we connect XOR gate (7486 IC) according to the figure 4
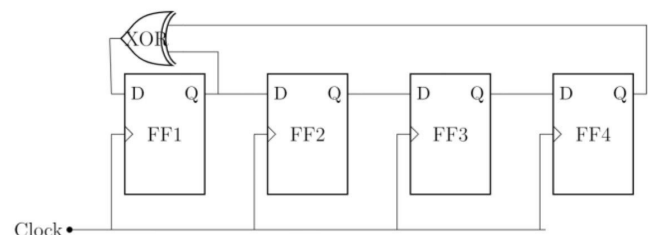


Fig. 4. Connection in XOR gate

5) After that we connect the decoder (7447 IC) and connect its A,B,C,D with $D_0,D_1,D_2,D_3$ respectively as per the figure 5
6) Then we place The seven segmented display and connect it with the decoder (7447 IC) according to the table 6 and the figure 6

Fig. 5. Connection in Decoder gate

| 7447 | $\bar{a}$ | $\bar{b}$ | $\bar{c}$ | $\bar{d}$ | $\bar{e}$ | $\bar{f}$ | $\bar{g}$ |
|---|---|---|---|---|---|---|---|
| Display | a | b | c | d | e | f | g |

Fig. 6. Connection of seven segmented display with decoder

7) Additionally we make connections like Vcc and GND to every IC as per the respective IC pinout for IC's 7474, 7447, 7486.

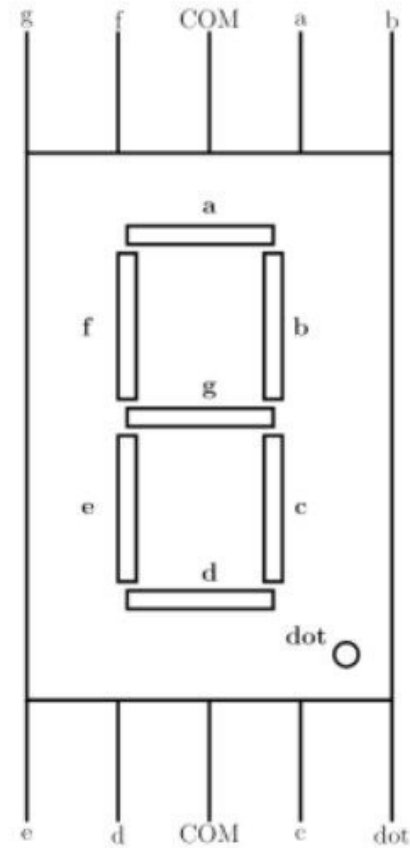8) Output was changing digits on the seven segment display the output is shown in figure 8
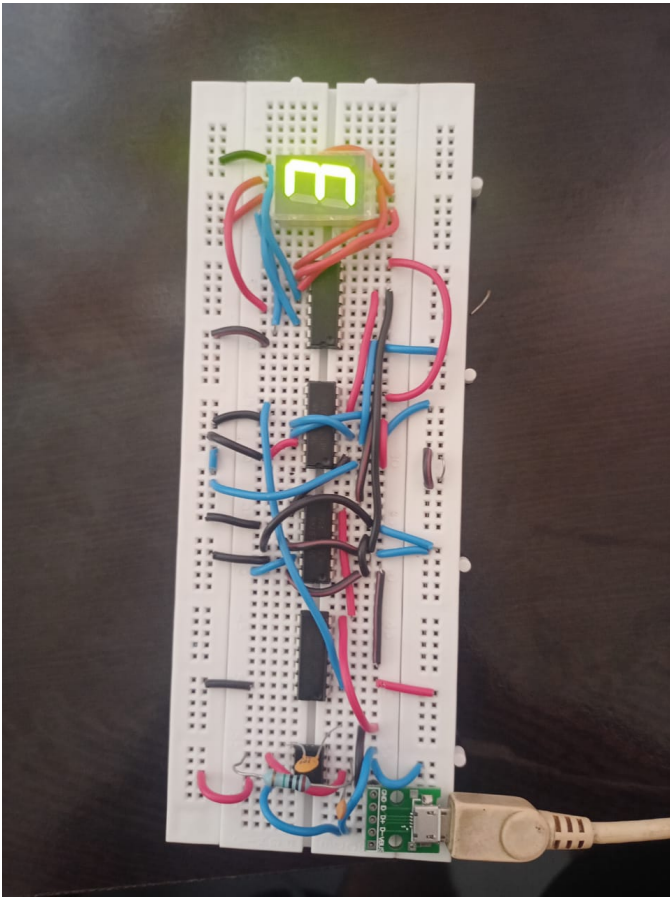


Fig. 6. Seven segmented display

Fig. 8.   output